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SKETCH OF A PLAN

FOR

MEMOIRS ON MEDICAL TOPOGRAPHY.

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IN preparing this outline, by which, it appears to me, the medical topography of a town, a district, or a country, may be advantageously drawn up, I am far from supposing that I have either exhausted the subjects of inquiry, or even indicated them all; but I trust it will be found that few points have been entirely omitted which are essential to the medical topographer, and I am convinced that, taking the present hints as the basis of his inquiries, he may render important services to science in general, while he materially assists himself in attaining a knowledge of those external circumstances which exert an influence upon the health of those among whom he may exercise his profession.

I shall divide the objects of inquiry into four general heads, and these again I shall subdivide into specific subjects. Under the first head I shall include the physical geography of the place to be described, comprising notices on its botany, mineralogy, and natural history. The second head will refer to the inhabitants, including an account of their food, habitations, customs, &c. Under the third head will be classed such subjects of inquiry as are

connected with diseases, whether endemic, epidemic, or sporadic; which appear under the form of epizooties, among the lower animals; or which affect the products of vegetation. To the fourth head will be referred miscellaneous objects of inquiry, or such as could not be so well arranged under any of the preceding. Many of the subjects are so closely connected, that they fall under more than one head, and they will be treated most in detail in that division of the subject under which they seem most naturally to range themselves.

I. THE NAME,—THE LATITUDE,—LONGITUDE,—AND BOUNDARIES. — These heads require little or no comment. If the place to be described is extensive, it will be necessary to note whether the situation is insular, or a part of a continent. If it is only a small district or town, it will be necessary to state what distance it may be from the sea, and what elevation above it; what distance it may be from the metropolis, and the modes of communicating with it.

THE SEAS,—THE RIVERS,—THE LAKES,—THE WELLS,—THE MORASSES,—THE BOGS,—AND THE CANALS. — These are points upon which the topographer should bestow considerable attention, as they so materially affect the dryness or moisture of a country. The nature of the deposits, animal, vegetable, or mineral, which are left by the waters should be accurately ascertained: as on them, especially in warm countries, the most important consequences depend. The height to which the tide may rise in a river, as well as the rapidity or sluggishness of the stream, will materially affect these depositions; while the physical features of its banks, and the tortuosity of its meanders, will possess considerable influence, by concealing or exposing the substances deposited to the sun and the winds: hence also the depth of the waters, the soil

through which they flow, or in which they stagnate ; the height of the banks, the materials of which they are composed, the shelter which they afford, the nature of that shelter, whether of sedge, underwood, full grown timber, or rock, should all be pointed out ; and the accidental or periodical accumulations of filth or alluvial materials, which pollute or enrich the stream, should be described. The inhabitants of the waters, as well as their vegetable products, become incidentally an object of investigation, as they may conduce to the nourishment, or the destruction of man : and as many of them fix their “habitat” in waters peculiar for their rapidity, their clearness, or their slime, their presence may often distinctly mark the existence of such peculiarities. The surface for evaporation presented by the canals, the rivers, and other masses of water ; the aid which they may contribute to the drainage of a country, the facilities which they may afford to agriculture and commerce ; and the fitness of their waters for culinary purposes, are all objects of investigation. The state of the subterraneous moisture should be inquired into ; and this is frequently demonstrated in low marshy countries, Zealand, for instance, by the state of the wells, which are fed by the subterraneous water with which they are on a level. Indeed, the comparative healthiness of the villages in the Netherlands, is easily ascertainable by the inspection of their wells, the waters of which sink in proportion to the droughts of summer, and afford a proof of the constant exhalation of concealed moisture*. The nature and effects of those exhalations which arise from low muddy beaches should be specially inquired into, and no opportunity should be lost of ascertaining a point which seems not yet to be perfectly agreed on, viz., how far the admix-

* Pringle, Diseases of the Army, chap. i. part i.

ture of fresh water may accelerate or retard the corruption of the animal and vegetable materials deposited upon them.*

THE MOUNTAINS.—Their height, extent, and general direction ; the snows with which they may be covered, periodically or throughout the year; the rivers or streams which may arise in them ; the forest timber, plants, and minerals, with which they may abound ; the passes through them, and the influence they may exert over the currents of the winds; the interjacent vallies, and the state of their temperature, compared with that of the surrounding elevations, should all be noticed †.

THE CLIMATE.—A *complete* system of meteorology is not only unnecessary for the purposes of medical topography, but is of such difficult execution that the life of man seems inadequate to effect it; it is absolutely necessary, however, that some of the leading facts connected with the physical characters and medical effects of the climate should be given. The steadiness or mutability of a climate is a physical property which seems more to influence the health of man, than either its heat or its cold, abstractedly considered; and a knowledge of this can only be acquired by long and correct personal observation, or by averages drawn from the observations of several preceding years.

In whatever mode the topographer may choose to proceed, he should give accurate accounts of the highest, lowest, and medium states of the thermometer, barometer, and hygrometer, for two or three years at least, together with an account of the prevalent winds, and the occasional fogs, meteors, hurricanes, &c.

* Vide Lancisi de Nox. palud. effluv., lib. i. p. i. cap. 5.

† In general, for every two hundred feet of elevation, one degree of decreased temperature may be expected. The effects of the funnel-shaped chasms in the Ghauts of India, in tempering the heats of that country, are most remarkable.

It must be observed, however, that nothing can be more jejune and uninteresting than a protracted enumeration of the daily variations of the atmospheric temperature, weight, and moisture, or of the different shiftings of the winds, if the person who describes such occurrences does not deduce from them some practical information, by marking the effects which they produce upon the health of man, and upon the face of nature. Hence it is that many of those volumes which have cost their authors the minute labour of years to compose, lie so often unconsulted amid the lumber of the library; but if to the changes of the state of the atmosphere, is added an account of the manifest influence which they have exerted on the health of those who were previously well, or on the diseases of the sick and convalescent,—then an otherwise trivial piece of information is converted into an interesting and an instructive fact. In like manner, if any particular state of the weather has a marked effect upon vegetation, it may consecutively produce a very powerful influence upon the health of the inhabitants of the district where it has prevailed. Upon the whole, while the medical topographer should by no means neglect minute and regular observations upon the changes of the weather, he should consider them not as a primary object of research, but should view them as merely subservient to the great purpose of explaining the origin and progress of disease; and it is by comparing the cause and the effect together, and repeating the comparisons faithfully and frequently, that registers of the weather can ever be made available to useful purposes; or can “illuminate that darkness of conjecture, reconcile that contrariety of assertion, and reduce to a rational system that facility of belief which has so long existed upon atmospherical influences.” These comparisons should be fully stated in detail; for few readers will stop in the course of their perusal to refer to

an appended weather table, and wade through the slow, dull, and dubious process of comparing degrees of the thermometer, and the anemoscope, with the variations of health. These records lose their utility and their interest by separation, and it is in vain to deny, that the most faithful recital of facts will often fail to make any impression, if they entail on the reader extraordinary and monotonous labour. It must be confessed, however, after all our pains, that we are still at a loss to state what precise share the weather may have in producing epidemics; for in years the same in every respect of winds, rain, &c. &c., the epidemics have been found to vary greatly, as has been long ago confessed by the English Hippocrates, Sydenham.

There are such a multiplicity of forms for registers of the weather, that the topographer can be at little loss in selecting a model, or in procuring from the observatories of large towns correct and satisfactory details; but it would be extremely desirable that the degrees of the thermometer, *in the sun*, to which the labouring classes are so much exposed, should be occasionally stated; and it should also be kept in view, that, if the observations are made uniformly at the same hour of the day, throughout the year, the atmosphere will have felt the sun's influence for a much longer period at some seasons than at others, previous to registering the height of the mercury. In detailing the state of the winds, it will be of essential importance to describe what tracts of land or water they blow over, and how far these may influence the deposition or absorption of heat and moisture, may alter the direction and force of their currents, or may affect the exhalations which they import or carry off; extensive tracts of forests will greatly modify the effects of the wind, and even a comparatively small number of trees will act as a check

on healthful ventilation, or will intercept the baneful miasmata of marshes. The ordinary effects of the atmosphere on inanimate substances should be noticed ; in some districts all polished metal speedily rusts ; and the existence of saline particles in the air, is inferred in others, by the remarkable fading of those dyed stuffs, which require acids to fix or heighten their colours. * Some peculiar states of the atmosphere have been observed to precede certain epidemic affections ; thus Dr. Rush states, that substances painted with white lead, and exposed to the air, have suddenly assumed a dark colour, and that a smokiness or mist in the atmosphere has generally preceded a sickly autumn in some of the American states. †

Although we are ignorant of the causes, we know that the long prevalence of certain winds frequently predispose the body to disease ; the effects of various winds are also remarkably displayed in the phenomena observable on trees and buildings. In the American forests, the bark on the north side of a tree uniformly thickens, and the north side of a brick building is said to be much more difficult to pull down than that of any other aspect. In our own country, buildings of certain species of stone ooze forth moisture, or effloresce, in those points where they are exposed to particular currents of wind. ‡

In all times, certain winds have been observed to produce deleterious effects on wounds and ulcers : these effects have proceeded from the south winds in some countries, from the east in others : at Gibraltar, such was the deleterious effect of the latter wind upon the wounded,

* See Chalmers's Diseases of South Carolina, vol. i., p. 11.

† Rush's works, Philadelphia, 2nd Edition, vol. iv., p. 174.

‡ Saline bodies effloresce in dry, and deliquesce in damp situations ; and furniture, in like manner, shrinks and swells.

after the battle of Algiers, that the *Leander* left that station without waiting for supplies ; a privation which was amply compensated by the improved state of the invalids, so soon as they were removed.*

In our own country, certain seasons are more productive of buboes than others, and under certain states of the atmosphere, not yet clearly understood, both these, and all other venereal sores take on, simultaneously, a malignant character.

The effects which the climate produces, or is supposed to produce, in the alleviation of certain diseases, as phthisis, syphilis, hooping cough, &c., should be distinctly and fully described ; while at the same time, those complaints in which it proves manifestly injurious, or where it retards convalescence, should likewise be mentioned. These points will also come to be more fully considered under the head of diseases.

Besides the points already mentioned, as proper to be recorded, with regard to the state of the atmosphere, there are two others, which those who have the means of ascertaining them, should never omit ; these are the states of the air with regard to magnetism and electricity. There are some facts known with regard to the latter agent, which tend to shew that the deficiency or abundance of electric fluid in the atmosphere, may greatly influence the health of man.

THE SOIL.—It will be of great importance to describe the general nature of the soil, and its elevation above the adjacent seas or other waters, and to particularize those properties by which it may favour the retention or the transmission of water, either at the surface or at a distance from it. With this view, it will be necessary to state the

* Dr. Quarrier, in *Med. Chir. Trans.*, vol. viii., p. 7.

proportions of pasture, arable, and wood land, and whether the soil is alluvial, rocky, gravelly, clayey, sandy, &c.; while the stratification or intermixture of all these materials, as far as they have been ascertained, should be mentioned.

The periods of the year at which noxious exhalations arise from the soil in greatest abundance, will become an important subject of inquiry; at the same time, it will be necessary to investigate the extent to which evaporation may have proceeded, when these exhalations become most deleterious. That they most abound when the waters are nearly or quite expended, has been observed by able physicians, and they have also endeavoured to account for it, by supposing, that the sun's rays then penetrating the miry soil, exalt vapour which had been long pent up, and may be supposed to have contracted vicious qualities, or become concentrated from having remained undisturbed by the wind. Whatever may be the cause, it is certain, that, in many countries, the malaria does not arise until all the surface water has totally disappeared, and leaves the whole face of the country, including the very courses of the winter streams, an arid desert*.

THE VEGETABLE, ANIMAL, AND MINERAL PRODUCTS of a country, have a powerful influence over the health of the inhabitants, and should be examined under the various points of view in which they may contribute to their food, their clothing, their warmth, and their domestic comforts; or as they may promote or retard these in a secondary way, by influencing population and manufactures, favouring the influx of new inhabitants, introducing new modes of living, or becoming subservient to the operations of commerce.

* See Chalmers's *Diseases of South Carolina*, vol. i., p. 6. Fergusson *Med. Chirur. Trans.*, vol. viii, p. 132.

In the countries which abound in certain vegetable products, the effects of moisture and putrefaction are often found seriously to affect the health ; of this, the culture of rice and various other plants, are striking examples.

The rearing of certain animals, as the silk-worm of Lombardy, and the Merino flocks of Spain, considerably affects the face of the country, and gives a new character to the natives. The periodical visits of certain birds, fishes, and even insects, prove most seasonable articles of supply in some instances, or are destructive to comfort and life in others.

The presence of extensive mines is marked with peculiar features, by the hand of nature. Among the more prominent instances of this, may be mentioned the gold and silver districts of Peru, the quicksilver mines of Almaden, and those of lead and tin in our own country, where *external* poverty and desolation reign ; while the presence of coal, wherever it is wrought, is the sure forerunner of a crowded and manufacturing population.

The early appearance of many plants, and the slowness or rapidity of their vegetation ; the torpidity, arrival, and departure of many quadrupeds, birds, and insects, will often mark more strongly than the indications of the glass, the nature of a climate ; and the judicious naturalist will avail himself of the circumstances in his topographical description. Strong indications of the healthfulness of a country may be drawn from its plants and animals, and the approach of unhealthy seasons has often been marked by the changes produced on them. In America, the common house-fly has disappeared, while mosquitoes have multiplied, and several new insects have been observed, previous to some of their malignant epidemics ; and, at similar periods, certain trees have emitted unusual smells, the leaves of others have fallen prematurely, and the

fruits have been of inferior size and quality ; while in some places, an unusual growth of vegetable productions (fungi) have preceded the most destructive scourges of mankind.

To give a complete medical topography, all the products of the district, whether poisonous, edible, medicinal, or employed in the arts, should at least be *enumerated* ; and should be particularly investigated, as far as they may immediately affect the health of man.

Among the various products, those which are applicable to medical purposes, should be specially described, and this, whether they enter the established pharmacopœia, or are employed as succedanea, by the regular practitioners, or as specifics by the inhabitants, or by empirics. The most approved modes of preserving and preparing them should be fully detailed, together with their doses and sensible effects. In this enumeration, the mineral waters will claim peculiar attention ; the complete analysis of these should be given, or at least such experiments should be made upon them, as may serve to point out the most prominent articles with which they are impregnated ; at the same time should be mentioned the articles with which they are adulterated, improved, or imitated at the spring, or at more distant places. The temperature of the thermal waters will of course be mentioned, together with the effect which their external application produces, or is supposed to produce, upon those who have recourse to their aid. Saline springs not used for medicinal purposes, or mines of rock, salt, alum, &c., whether wrought or unwrought, will be deserving of notice..

THE STATE OF AGRICULTURE.—This has a manifest and powerful influence on the health of the inhabitants of a country, and should therefore be fully considered, and not only are the immediate effects of cultivation of importance

to be known, but it will be also necessary to inquire into the effects of such after processes as are ascertained, or suspected, to be unhealthful, especially where the putrefaction of the substances treated, is a necessary part of them, as the preparation of flax, indigo, &c.*

THE STATE OF THE ROADS AND COMMUNICATIONS.—The facilities of communication are of such importance to the comfort and health of the inhabitants of a country, as to deserve being distinctly noticed.

A map of the places described will greatly enhance the value of a topographical description; nothing more will be necessary, than a simple outline of the boundaries, of the direction of the mountains and rivers, and of the situation and extent of the forests, lakes, morasses, bogs, &c. A sketch of the stratification of the soil would also be a valuable addition to the view of its surface.

II. THE POPULATION.—The aggregation of large masses of human beings produces effects so important upon the health, as to become a special object of inquiry to the topographer; he should, therefore, endeavour to obtain the most correct statements within his power. If, in a country, parish, or district, he should compare the number of inhabitants with the space over which they are spread; and if, in a town or city, he should ascertain the bounds within which they are pent up, and how far the evils of confinement are aggravated or relieved by various external circumstances, of which the following are the most important.

THE DWELLINGS.—In describing the dwellings the medical topographer should notice the exposure, the soil on

* See Bancroft on Yellow Fever, p. 195 note, for an excellent illustration.

which they are founded, their elevation above it, the materials of which they are built, the mode in which they are finished, especially as concerns their dryness, their warmth, and their ventilation, and facilities afforded to the inhabitants for preventing or removing accumulations of filth. Under this view will come to be examined the nature and extent of the cess-pools and sewers proceeding from the houses to the common receptacles of filth ; and, above all the conveniences for the reception of human ordure. It is a fact well worthy of attention, that the inhabitants of those buildings which are run up in a slight manner, at the back of a row, and exposed to the effluvia of privies, have been found most susceptible of the contagion of typhus fever.* The average number of inhabitants in each dwelling, the cubical contents of their rooms, and the number and direction of the means of ventilation, should be ascertained, with a view to show, how far they may enjoy the advantages of a free circulation of pure air. Much sophistry and much special pleading have been employed to invalidate the opinions of those who hold that the effluvia arising from the human body, in close and crowded situations, are productive of contagious diseases ; but the facts collected upon this point appear to be incontrovertible.

The mode in which the streets are laid out, their width or compactness, their pavement, their drainage, † their exposure to the sun and to the wind, are considerations of much importance. The difference of a few paces may make a very considerable difference in the health of the inhabitants ; thus at Rome some streets, nay, certain points, sides, and even houses, of some streets, are more damp,

* Ferriar, Medical Histories and Reflections.

† Compact gutters, by preventing the sinking of the water into the earth, are reckoned, by Dr. Rush, one cause of the unhealthiness of Philadelphia.

chilly, and exposed to the malaria, than others ;* for instance, the wards of the Santo Spirito Hospital to the south and south-east, are more insalubrious than others, and the lower apartments of some hospitals are affected with the malaria, while those immediately above escape its influence. A very slight obstacle, as a gauze curtain, is said to prevent the entrance of the malaria of Padua. In the West Indies, soldiers residing in the lower part of the barracks were found to be more liable to yellow fever than those in the upper, in the proportion of two to one.† In many of our towns certain streets or districts have been always remarkable for fever, and they have been as remarkably exempted from its attacks when the air has been allowed freely to percolate them, by the removal of old walls or compact masses of houses, which prevented ventilation and the access of the solar influence.

THE BEDDING,—CLOTHING,—AND FURNITURE.—With the superfluities of the rich the medical topographer has little to do ; but on the necessary supplies of these articles in possession of the poorer and more numerous part of the population, much of their comfort and health depends. A sufficiency of bedding and clothing, to obviate cold and moisture, is indispensable to health ; and, during the prevalence of contagious diseases of the typhoid class, is of the utmost importance as a preventive. A very striking illustration of this will be found in the medical report of Dr. Ainslie, Mr. Smith, and Dr. Christie, on the epidemic fever which lately ravaged an extensive district in India. Wherever the inhabitants were elevated above the surface, by settles or bed-frames, and defended by rugs, there the

* See Clark's Medical Notes.

† See Fergusson in *Med. Chirur. Trans.*, vol. viii., p. 587. Dr. Nicol observed a similar fact in India, see *Edinburgh Medical and Surgical Journal*, vol. ii. p. 292, et seq.

disease was decidedly less frequent and less fatal in its consequences. Every article of furniture which can aid in the promotion of cleanliness, in the preservation and cooking of food, and in other purposes subservient to domestic economy and personal comfort, must essentially contribute to the preservation of health. The materials of the beds and furniture, the frequency of their renewal, and the modes adopted to preserve and purify them, are all worthy of attention.

THE FUEL.—The nature of the fuel, and the facility of procuring it, is of the utmost consequence to all ranks of society, but especially to the poorer. It is scarcely possible to conceive how thousands of the pauper inhabitants of Ireland could protract their existence, did not the bogs amid which they pine, furnish them with the means of cooking their food, and obviating the effects of the chilling damps with which they are surrounded.

THE DIET.—The quantity, the quality, and the regularity of our meals have such an obvious influence upon health, that the medical topographer should be minute in his inquiries upon these subjects. He should enumerate the species and the price of the different articles, the modes in which they are prepared or preserved, the adulterations which they undergo, and the condiments which are employed along with them. The nature of the beverages used should be investigated, and their effects, when taken in moderation, or pushed to excess, should be described. The diseases of ale drinkers are very different from those of wine drinkers, and these again greatly differ from the diseases of drinkers of ardent spirits. The nature of the water used as an article of diet, or employed for culinary purposes, should be ascertained ; and those impregnations which act directly on the kidneys, the bowels, or the skin, should be investigated, while the secondary effects which

their hardness or softness may produce, by their adaptation to the purposes of cookery and cleanliness, should be pointed out. The abundance or scarcity of this vital article should be particularly specified; the sources from whence it flows, the materials through which it is conveyed, and in which it is preserved, the accidental pollutions which may fall into it in its course, and the facility with which it disembogues itself after having served the various purposes of life, will be important subjects of consideration. The effects of the water on strangers should be mentioned; in a great number of situations no new comers can taste the water with impunity, and the same effects are produced on their cattle. The ordinary mode in which nature appears to remove these noxious effects, is by the bowels; but it will be an interesting object of inquiry to ascertain what other outlets she may employ for that purpose.

The use of snow water for drink, in Alpine regions, has long been supposed to give rise to goitrous tumours. This mode of explaining these unseemly appearances has been questioned by some, upon the principle that the disease is frequent in Sumatra, where snow and ice are never seen, and unknown in Chili and Thibet, though the rivers of these countries are chiefly supplied from melted snow; but a sufficient proof that goitre proceeds, in some cases, from snow or ice water, is, that navigators, who were not exposed to any other of the circumstances which affect the inhabitants of the Alpine regions, yet, after having been forced to drink ice or snow-water, have become affected with the disease. It has been supposed that goitres are peculiar to those valleys which run from east to west, and that they are not to be found in those which run from north to south; but this appears to be without any foundation. Marsden, in his history of Sumatra, attributes goitres to the breathing of the damp foggy air condensed

in valleys situated between ranges of high mountains ; for the disease is found in such situations in Sumatra where no snows exist, but where the natives are exposed to the *caboot*, or thick fog. “Cretinage,” or cretinism, seems also peculiar to mountainous regions, where goitre is endemic ; it is extremely difficult to determine what connexion there may be between the two diseases, but they are found together in the mountains of Switzerland, in the Pyrenees, and, according to Sir George Staunton, in the mountainous parts of China.*

It will be a most interesting and legitimate object of inquiry to ascertain how far cutaneous affections depend upon the peculiar sources from which the water in ordinary use has been procured.

The good or bad effects produced, or supposed to be produced, in some districts, by some articles of food long continued, should be inquired into ; the use of oil is stated in some countries to predispose to hernia ; beer and cyder are supposed to be productive of calculous disorders, while salted meat is, on no slight grounds, presumed to prevent them. In tropical climates, calculous is scarcely known. On the continent, and in Britain, it occurs in the public hospitals in about 1 case in 300 or 400 patients. In the cyder counties of England, it is much more frequent than in many others ; but in the Norfolk district, it is as frequent as 1 in 38, a proportion exceeding any thing which has been noticed in any other district of Europe. In the British army, calculous complaints are exceedingly rare, but I do not know whether any comparative estimate has been made of their frequency ; in the navy, however, they are

* See a good paper on this subject in the *Edinburgh Medical and Surgical Journal*, vol. v., p. 31 ; and Fodere “*Sur le Goître et Cretinism*,”

strikingly low, as 1 in 17,200, and this is principally attributed to the use of salted food. *

THE EMPLOYMENTS.—The nature of the employments or trades of the inhabitants, the periods occupied in them, whether in close, crowded, and damp apartments, or in the open air ; the metallic or other vapours, or the currents of air or water to which the workmen are exposed, and other similar circumstances, should all be most minutely particularized. To these particulars should be added the nature of the diseases produced among artificers, the means they adopt to prevent their occurrence, and the remedies peculiarly useful in their removal. †

THE AMUSEMENTS AND CUSTOMS.—As these mark the general habits, and often in particular instances lead to disease, they are well worthy of enumeration. The topographer should notice whether they are active or sedentary, whether exercised within doors or in the open air, whether they tend to the excitement of the depressing passions or not. Even the most trivial local amusements may produce the most powerful effects on the passions and the health ; a fact which will not be denied by those who recollect the effects of music in exciting the Scotch highlander, or in producing nostalgia in the Swiss mountaineer.

THE MORALS, — THE EDUCATION, — AND MODE OF REARING CHILDREN.—The influence of religious instruction on the modes of living of individuals, cannot escape the most unconcerned observer, and hence the general state of the morals of the district which he describes should be an object of the medical topographer's investigation. In pursuing this he should not lose sight of the number of

* See Hutchinson in *Medico-Chirurgical Transactions*, vol. ix., p. 459.

† See Rammazini and *Edinburgh Medical and Surgical Journal*, vol. iii., p. 170.

inhabitants which the exhortations and the example of fanatics have so constantly consigned to the mad-house and the foundling hospital ; while he will perhaps find that equal numbers have been reclaimed from the gin shop,—another fruitful source of supply to one at least, if not to both, of these establishments. Under this head the effects of early marriages upon health seem most naturally to range themselves.

THE POLICE of a city or district has a considerable influence upon the health of the inhabitants at all times, but in periods of public calamity, from contagious disease, it becomes absolutely essential to it. The subject of medical police in general is one of such extent, and comprising such a multiplicity of objects of inquiry, as to form a distinct science of itself. I shall, therefore, content myself with enumerating a few only of the principal points which appear to bear more directly on the subject of medical topography, and which should be minutely inquired into by all who cultivate that study.

The first of these is the establishment of common sewers, without which no town can ever be either a pleasant or a healthful residence, the erection of necessaries, the pavement, cleansing, and lighting of the streets ; the regulation of the slaughter-houses and markets ; the removal to convenient distances of burial-grounds and all manufactories productive of noxious exhalations ;* the establishing a control over the admission and lodging of vagrants ; the

* The consequences of burying in churches are now well known ; perhaps the best mode ever adopted, is that in use at the branch of the hospital of Incurables of Naples, near Torre del Greco. The burial-ground is divided into three hundred and sixty-five large deep vaults, one of which is opened every day of the year, and after bodies are deposited, is accurately shut. The process of putrefaction is completely finished before it is again opened.—See Eustace's Italy, vol. ii., 8vo., p. 346.

regulating the purchase and exposure of old clothes and furniture ; the controlling the venders of spirituous liquors ; the diminution, as much as possible, of the number of prostitutes ; and the holding out to them, and the lower orders of society in general, encouragement to have recourse to hospitals on the first appearance of disease among them.

THE STATE OF THE POOR. — Under this head should be enumerated their employments, the rate of wages, the price and nature of the food which they are enabled to procure for themselves, or which is supplied them, either as an equivalent for their labour or in the form of charitable donations ; the rent of their cottages or rooms ; the public institutions for their instruction and their support, and the friendly or other associations for their relief, &c. &c.

III. As the ultimate aim of medical topography is to ascertain every circumstance that has an influence upon health, the nature, extent, and varieties of the diseases of the district which he undertakes to describe, are subjects of primary importance to the topographer. Under the present, as well as the other heads of inquiry, much must be left to the judgment, and much must depend upon the opportunities for observation, but the following objects appear to me indispensably necessary to be investigated.

THE ENDEMIC DISEASES. — In the details on this head, the following points of inquiry should be particularly attended to. The age, sex, and constitution of those most commonly attacked ; the nature of the diet, employments, or situation which render them most liable to be affected ; the popular opinions on the disease ; the domestic prophylactics ; the mode of cure followed by the regular practitioners in private life, and the result of hospital treatment deduced from the tables of admissions, discharges, and deaths.

THE EPIDEMIC AND SPORADIC DISEASES.—The same subjects of inquiry should be attended to in these as in the preceding class, and the utmost caution should be observed in examining into the proofs of the contagious or non-contagious nature of the diseases of whatever species. It has become of late fashionable to deny the contagious nature of some diseases, as typhus and plague, and to support this opinion with a series of sophistical arguments, backed by a display of classical learning. With regard to this last, any well-read school-boy would be able to prove that the ancients, if not acquainted with the *doctrines* of contagion as now taught, were intimately acquainted with the *facts*; thus in describing the pestilential disorder which raged at the siege of Syracuse, and which affected both the attacking and besieging armies, Pliny expressly says that the disease was spread “*contactu ægrorum*,” by the contact of the diseased, which is strictly and unequivocally the operation of contagion. With regard to the arguments, one *fact* overwhelms them all, and these facts are of such daily occurrence, in the typhus fever of this country, for instance, that to deny them savours more of determined obstinacy than of philosophical scepticism. To the army and navy surgeon doubts as to the propagation of certain diseases by contagion, may be of the most fatal consequences; considering the subtle nature of the matter of the febrile contagion, it becomes of the very highest consequence to ascertain the state of the atmosphere in which it is most readily diffused. Moisture has a considerable effect; thus, when the atmosphere is saturated with water in Egypt, after the overflow of the Nile, the plague is most common. In that country our troops quartered on the moist shore of Aboukir suffered severely; while the troops that marched to Cairo escaped the contagion of plague. On the other hand, while the dry

harmattan of Africa blows, epidemics cease, the small-pox, which is at other times fatal, among the number ; and the infection cannot be easily communicated, even by inoculation, or any other process of art.* It is well known that volatile bodies are sooner rendered gaseous in moist than dry weather : thus, lime burns readier in the former than the latter ; the perfume of flowers is more perceptible, and the stench of ditches and sewers more oppressive, when the air is charged with moisture, as about the falling of the evening dew, or pending rain.

There is another extremely contagious disease, purulent ophthalmia, in the propagation of which, a moist state of the air is most decidedly favourable to the spreading of the contagion : this has been observed both by Volney the French “savant,” and Assalini, an experienced army surgeon, as well as by our own medical officers in Egypt ; and even Prosper Alpinus, who attributed the disease to the heat, dust, and alkaline nature of the soil, admits that it is most frequent in autumn, although the inundation of the Nile completely relieves the eye from the action of the sand and hot winds of the desert. It is from this effect of moisture in conjunction with the contagious matter, that our soldiers in Egypt caught the complaint, chiefly in the dews of night. In England, Dr. Vetch invariably found marshy situations the most unfavourable to the cure.†

HEREDITARY OR FAMILY DISEASES claim the attention of the topographer, and not only should their existence be ascertained, but any modes which may have been adopted to prevent or to cure them, should be fully detailed.

The existence of FEIGNED DISEASES should not be overlooked, and the details on this point should be ample,

* See Philosophical Transactions, vol. lxxi.

† See Vetch on Ophthalmia, p. 151 ; Assalini and Power on Egyptian Ophthalmia ; and p. 611, et seq. of the following work.

embracing the history of individuals, the particular diseases and symptoms which they have imitated, the real diseases which they have brought on, and the modes adopted for their discovery. The history of the fasting woman of Tibbury, and the steps which led to her detection, will long be remembered in the medical annals of this country.

The diseases of the manufactories, the prisons, the poor-houses, and boarding-schools, should not be forgotten, nor should those from IMITATION, which so often arise in the latter establishments, be overlooked. These diseases of imitation also often prevail in other situations, for instance, the convulsive disease in Wales, Shetland, and elsewhere, and the disease known by the name of the "louping ague," in Angus-shire.*

TABLES OF MARRIAGES,—BIRTHS—DISEASES,—AND MORTALITY,—if drawn from extensive and authentic collections of reports, become peculiarly valuable, and the greater the number of points of comparison with preceding years which they furnish, the more is their value enhanced.

EPIZOOTIES.—The diseases of cattle, and other animals, should be inquired into, particularly when they have been very extensive and fatal. The most severe epidemics, the plague, for instance, which have afflicted man, have been preceded by similar affections of the lower orders of animated beings. The influenza, which raged in this country, and extended almost over the world, in the latter end of the eighteenth century, was preceded in some places by a mortality among cats, and in others, birds were found to be peculiarly affected. The diseases of the cattle, which serve for agricultural purposes, or directly for the food of man, should be an object of particular inquiry. The

* See a full account of these in the *Edinburgh Medical and Surgical Journal*, vol. iii, p. 434.

health of this class of animals is peculiarly linked with that of the human species who tend and feed them, and who, in return, owe to them so much of their comfort and their support. In the epidemic which lately ravaged some of the Indian provinces, upwards of 44,000 head of cattle died in one district in the course of seven months, partly from want of food and partly from disease.

It is asserted that dysentery is produced among sheep closely pent up, and that the disease thus generated becomes contagious among these valuable animals.* The nature of the rot to which sheep are subject, is an inquiry of much importance ; the more so, that in its early stages it is found that they take on fat, and are therefore in that morbid state often applied to the purposes of food. There can be no doubt that the flesh of animals who have died of disease, or who are killed when overheated by excessive labour, is highly injurious to health ; and even the flesh of those who have died a natural death has occasioned sickness, and has in some instances proved fatal. †

THE DISEASES OF PLANTS employed as articles of food should be inquired into, as they are by them deprived of a considerable portion of their nutritive qualities, and even rendered deleterious : thus, to the ergot or blight in rye, a most extensive and fatal endemial gangrene has been traced in France, and there is reason to suppose that a similar disease has been produced from blighted wheat in England.

POPULAR MEDICINE.—Under the head ENDEMIC DISEASES, I touched upon a branch of this subject, but it is worthy of being still farther enlarged upon. In many

* See Edinburgh Medical and Surgical Journal, vol. vi., p. 235, and Dr. Duncan, junior, in the third vol. of the Transactions of the Highland Society.

† The diseases produced by the use of various animals, while out of season, as it is called, should be considered under the article “ Diet.”

districts periodical bathings, bleedings, purgings, vomitings, diet drinks, &c. are resorted to, under the supposition that sickness in *general* is prevented by such practices : while there are other practices adopted for the prevention and cure of *particular* complaints. Rum and milk, egg and brandy, and similar disguised drams, are in high estimation in incipient cases of phthisis, in some districts, and contribute to swell the number of annual victims to that scourge of our islands. The popular remedies used for the diseases of cattle and other animals, should also be noticed.

HOSPITALS.—An account of the establishments of this description, whether for the reception of particular diseases as fever mania, syphilis, &c. for lying-in women, foundlings, blind, deaf and dumb, or for more general purposes, should be a very principal object of the medical topographer's inquiries. He should inform us of the site, size, and plan of the hospital, the number and accommodation of the wards, with the methods of ventilating, warming, and cleansing them ; the plans for separating and classifying the patients, their numbers, and the measures pursued for obviating or checking contagious diseases among them ; the materials and arrangement of their beds, bedding, and other articles of furniture ; the means of collecting and conveying the sick to the hospital, with a statement of the obstacles or facilities of access to the building itself, as well as to its various apartments. We should have an account of the plan, extent, and arrangement of the kitchens, baths, and wash-houses, and of their supply of cold and hot water, and steam, together with a detail of all contrivances for the abridgment of labour ; the diminution of the consumption of fuel ; and the increase of the nutritive quality of the food, or its fair, regular, and comfortable distribution. Knowing, as we do, how much the

individual comforts of the sick and the general good order of an hospital depend on the water closets or "latrines," we should attach great importance to the description of their site, size, and actual state, the extent of their supply of water, air, and light, and the measures adopted for removing the soil, or preventing the diffusion of unpleasant and unhealthy effluvia. To all this information on the immediate accommodation for the sick, there should be added an account of the store-houses and offices of every description ; the airing ground for the convalescents ; the places of reception for the dead, with the modes of disposing of the bodies, &c. &c. We should have also a statement of the rank, number, salaries, and duties of the various officers of the establishment, whether medical, surgical, or purveying, with an enumeration of the servants of different classes, their wages, the proportion which they bear to the sick, and the respective duties which they perform. In short, we should wish for information on every point subservient, or preparatory to the grand objects of administering food, medicine, and surgical assistance. We should then be prepared for a view of the mode of carrying on the medical, surgical, pharmaceutical, and purveying duties, which would naturally lead us to the history of new or peculiar practices or operations ; accounts of new remedies ; details of the diet, ordinary and extraordinary, administration of wine, and other cordials, &c. The sources of revenue from which these wants are supplied should be specially enumerated, and from all these premises, we should have no difficulty in entering into a view of the expenses of the establishment. The nature of the records and annals kept at the hospital should be stated, and, from these, interesting information on comparative mortality, prevalence of disease, and peculiar epidemics, originating either from within or without, might

be afforded ; as well as satisfactory notices on every point, medical, statistical, or financial.* The same principles of examination should be applied to prisons, lazarettos, work-houses, &c.

If there are any veterinary hospital establishments, they should be described ; and any peculiar practices or operations by the regular profession, or quacks, should be mentioned.

SPONTANEOUS CURES.—Diseases in general have not a natural tendency to terminate in death, and some, if not interfered with, proceed spontaneously to a favourable termination. The medical topographer should investigate these cases, and should endeavour to discover how far external circumstances, which do not come under the head of medical means, may have aided the efforts of nature. This inquiry will also lead him to the investigation of the effects of the climate and situation which he describes, on diseases imported into it. The disease for which change of climate has hitherto been principally recommended, in this country, has been phthisis; but there can be little, if any, doubt, that many lives have been sacrificed in this way. Physicians, judging from latitude, have supposed that many situations *should* be favourable to phthisical patients, which, on trial, have proved remarkably the reverse. Many parts of the south of Europe come under this character, from the nature of their climate alone; and many others, which are more fortunate in this respect, are eminently defective in all the domestic and medical comforts which are of the last importance to the

* I have already given this outline of inquiry into the state of hospitals in my review of Dr. Carter's work on Climate, &c. in the sixteenth volume of the Edinburgh Medical and Surgical Journal, p. 76 ; but I think it more convenient and more adapted to the purpose of the present paper to reprint than to refer to it.

recovery of the invalid. The effects of climate in accelerating the cure of syphilis, of cutaneous affections, of diseases produced from the excessive employment of mercury, and of other chronic affections, should also be an object of inquiry.

THE STATE OF THE PRACTICE OF PHYSIC AND SURGERY, as well as that of EMPIRICISM, should be noticed; the privileges or the control exerted over the members of the profession, with their divisions, numbers, &c. should be stated; as also their various institutions, libraries, societies, &c.; their peculiar doctrines and practices should be noted generally, and anything of special interest should be particularized; the progress of vaccination should be minutely inquired into. Upon the circumstances above stated, either singly or combined, will greatly depend the last and most important object of the investigations of the medical topographer, with which I shall close this class of suggestions.

LONGEVITY. — Not only the remarkable instances of longevity should be given, but a general view of the mortality among all ages and sexes, extended to as long a period of years as the inquirer can refer to, marking those which have been particularly affected by epidemic or contagious visitations. If the inquiries of the topographer extend over a large surface of country which comprises several districts, tables of mortality for each district should be given, otherwise a very incorrect idea may be impressed on the mind of the reader; thus, from Dr. Price's calculations, there is great reason to suppose that, in hilly districts, half the numbers born live to the age of forty-seven; and that one in twenty reach so far as eighty years of age: while, in marshy districts, one only in fifty-two attains that period of life, and only one-half the number born survive to the age of twenty-five. There is also, as is well

known, a considerable variation between the ages of persons who reside in towns and in country parishes, insomuch, that, in some instances, the difference is more than double, some cities being calculated to give a mortality of one in nineteen, and some healthy country villages being reported so low as one in forty, fifty, or even sixty, although it must be confessed that there is great reason to suppose that these estimates have been overrated, from inattention to concomitant circumstances. It is certain, however, that those employed in the insurance of lives estimate the longevity of a country village at fifteen, while that of the metropolis is only rated at ten and a half.*

IV. Under the fourth head should be classed those miscellaneous topics of inquiry which more remotely bear upon the medical topography of a town, district, or country, and which could not be so conveniently arranged under any other heads. Peculiar circumstances will of course contribute to the enlargement of these, but the following appear the most important.

A catalogue of the works already written on the subject of the places described, whether referring to their topography, natural history, or diseases—Notices on the subjects of the colleges, or schools for medical education, of their museums and libraries, and of the rare and curious articles contained in them, whether preparations, books or manuscripts—Notices on singularities in the formation of the brute, and more especially of the human species, as dwarfs, giants, cretins, &c., and on such persons as have been remarkable for their physical powers and propensities, as strength, voracity, &c. &c.—Notices of eminent medical authors and practitioners who have flourished or live in

* Hints for an Insurance Company for Kent and Sussex, 1804, p. 7.

the places described—Notices on important and curious objects of botany, mineralogy, natural history, &c. As the excellent directions of Professor Jameson, addressed to the contributors to the Museum of the University of Edinburgh, may not be in the possession of many of my readers, and as they will enable any common observer to preserve various important contributions towards the natural history of the place where he resides, or which he accidentally visits, I shall conclude this paper with an abridged statement of them.

“QUADRUPEDS AND BIRDS are to be preserved by taking off their skins, which may be easily done by making an incision in a straight line, from the vent to the throat, and removing the skin by means of a blunt knife. The skull and bones of the legs and feet are to be left. The brain, eyes, and tongue, ought also to be extracted. The skin, in order that it may be preserved from decay, should be also rubbed on the inside with some one of the following compositions : 1st, tanner’s bark well dried and pounded, one part ; burnt alum, one part ; and in a hot climate one part of sulphur, to be well mixed.—2nd, tanner’s bark well dried and pounded, one part ; tobacco, perfectly dried, one part ; burnt alum, one part ; add to every one of these ingredients one ounce of camphor, and half an ounce of sulphur. (N.B. No sublimate or arsenic ought to be put on the skins, as both substances destroy their texture.) These compositions to be kept for use in well corked bottles or jars.

“Skins when thus prepared, and partly dried, must be packed carefully in boxes, the lids of which ought to be pasted up, and in the paste used in fixing the paper, a little corrosive sublimate must be put, which prevents insects from eating through the paper.

“ REPTILES AND FISHES are best preserved in spirit of wine, rum, or whisky, some of which must be injected into the stomach, through the mouth, and into the other intestines through the anus. Before putting them into bottles, jars, or barrels, they ought to be washed clean from slimy matter. If long kept in spirits before they are sent, the spirits should be changed two or three times. The jars or bottles ought to be closed by means of sheet-lead and bladders. The larger reptiles, as crocodiles, and the larger fishes, may be preserved in the same manner as quadrupeds and birds.

“ ANIMAL CONCRETIONS.—Concretions of various kinds are occasionally found in the brain, lungs, heart, liver, kidneys, gall-bladder, intestines and urinary bladder. The stomachs of many animals afford concretions of different kinds, particularly those known under the name of *bezoar stones*; and travellers inform us, that stones are met with in the eggs of the ostrich. All of these bodies are interesting and valuable to the natural historian.

“ SKELETONS.—Collectors ought not to neglect to preserve the skeletons of the different species of animals. Of man, the skull is the most interesting part, as it varies in the different races of the human species, and is also frequently singularly altered by the practices of savage tribes. The best way of cleaning bones is to expose them to the air, and allow the insects to eat off the flesh. This being done, they ought to be washed with sea-water, and afterwards freely exposed to the sun. The best skulls are obtained by putting the whole head in rum or whisky, or a strong solution of alum; and both male and female heads ought, if possible, to be preserved.

“ MOLLUSCOUS ANIMALS,—VERMES,—AND ZOOPHYTES.—Molluscos animals, such as cuttle-fish, the inhabitants of shells, &c., vermes or worms, zoophytes, or animals

of the coral and other allied kinds, ought all to be preserved in spirits ; and in the two former classes, viz. the mollusca and vermes, the spirit of wine should be injected into the intestines, by means of a syringe, to prevent the putrefaction of the internal parts, and the consequent destruction of the organs of digestion, respiration, and of the nervous system. Many zoophytes or corals, or rather their houses, may be preserved dry ; but fragments of every species ought to be put into spirits, that the real structure of the animal may be discovered.

“ SHELLS, or the coverings of molluscous animals, are anxiously sought after by the naturalist, not only on account of their great beauty, but also from their intimate connection with the various fossil species met with in rocks of different kinds. The best live shells are collected by means of a travelling-net, such as is used by fishermen, if the depths are not too great ; they are also brought up by the cable in weighing anchor, the log-line, and in sounding.

“ After a storm, good shells may be picked up on sea beaches or shores, as the violent agitation of the ocean in a tempest separates them from their native beds, and often casts them on the shore. Shells that have been much tossed about by the waves are of less value than fresh ones ; but these, when other specimens are not to be got, ought to be carefully collected. Many interesting shells are found in rivers and lakes ; and numerous species occur on the surface of the land.

“ Fresh shells, or those in which the animal is still alive, ought to be thrown into hot water, the temperature of which may be gradually brought to the boiling point, by the repeated additions of hotter portions, by which means the animal will be killed ; the shells are allowed to cool for two or three minutes, and then the animal is picked out.

“ INSECTS.—Beetles of every kind are speedily deprived of life by putting them into boiling water, which does not injure those having black, brown, or any dark colour; but those which are covered with a fine down, or have brilliant colours and lustre, should not be exposed to moisture, but are easily killed, if put into a phial, and placed in a vessel of boiling water for some time. When insects are quite motionless, such as have been in the water should be exposed to the air and sun for a day or two, until perfectly dry; in this state they are to be placed in boxes with cotton-wool, along with camphor. Beetles may also be preserved in spirits of wine.

“ Butterflies, moths, and many other tribes of insects, with delicate and tender wings, may be easily killed, by pressing the thorax or breast betwixt the finger and thumb; and it is preferable to have the wings closed, because they thus occupy less space, their colour and lustre are better preserved, and they can be expanded afterwards by the steam of hot water. Care should be taken that the antennæ or feelers, and legs, are not injured. A pin should be stuck through them, by means of which they are fastened to the bottom of a box, lined with cork, or to one of deal or other soft wood. Camphor ought to be put into the box.

“ The arrachnides or spiders are best preserved in spirits. In collecting insects, we use either the forceps or a net. The forceps are about ten or twelve inches in length, provided with fans of a circular or other form, and are covered with fine gauze. They are held and moved as a pair of scissors. The net is very easily made. It is of gauze, or any very fine open muslin, made upon a piece of cane of four feet long, split down the middle about the half of the length: the split part is tied together, so as to form a hoop, upon which the gauze is sewed in the form of a bag; the lower part serves as a handle, and

with this, all flying insects may be very easily caught. When the insect is once within the rim of the net, by turning it on either side its escape is completely prevented by the pressure of the gauze or muslin against the edge of the hoop.

“ **CRABS.**—Crabs, lobsters, &c. may be suffocated in spirits of wine or turpentine, and then dried in an oven.

“ **CRUSTACEOUS ANIMALS.**—Sea-stars, after washing in fresh water, may be extended on boards by means of pins, and when dry, laid between folds of paper, and packed in a box with a little camphor.

“ In echini, or sea eggs, the soft internal parts are to be extracted by the anus; they are then to be stuffed with cotton, and carefully packed with tow or cotton. Particular attention should be paid to the preserving of the spines.

“ **SEEDS.**—In collecting seeds, it is desirable that they should be well ripened and dried in the sun. Large quantities should never be put together, but only a few, and these well selected. They retain their vegetative powers much better if tied up in linen or cotton cloth, than in other substances; and if then packed up in small boxes, and placed in an airy part of the ship, there is every probability of their arriving in a sound state. The same remark applies to bulbous roots. Bulbs should never be put in the same box with seeds. The boxes with seeds, and with bulbs, ought never to be put into the ship's hold.

DRIED PLANTS.—The greater part of plants dry easily between leaves of books, or other paper. If there be plenty of paper, they often dry best without shifting; but if the specimens are crowded, they must be taken out frequently, and the paper dried before they are replaced. Those plants which are very tenacious of life ought to be killed by the application of a hot iron, such as is used for

linen, after which they are easily dried. The collections are to be carefully packed in boxes with camphor, and closed in the same manner as directed for quadrupeds and birds.

“ MINERALS.—I. Every mineral, from the most common clay or sand, to the gem, ought to be collected.

“ 2. Specimens of rocks, such as the granite, porphyry, limestone, &c., should, if possible, be broken from fixed rocks, and not from loose masses, which are generally decayed. In selecting the specimens, one set ought to represent the different varieties of appearance presented by the rock in the fresh state; another, the rock in its different states of decomposition.

“ 3. When the specimens of simple minerals, or rocks, contain crystals, they ought to be wrapped in gauze paper, then in cotton, and afterwards in several folds of strong wrapping paper.

“ 4. The specimens of rocks ought, if possible, never to be less than four inches square, and one inch in thickness, and of a square form. As soon as they have been prepared, they should be labelled and wrapped in several folds of strong wrapping paper. When paper cannot be procured, moss, or other soft vegetable substance, may be substituted for it.

“ 5. The sands of deserts, steppes, and rivers, ought to be carefully collected. The sands of rivers often contain precious stones and metals, and hence become very interesting objects to the naturalist. The sands of deserts and steppes throw much light on the nature of the surrounding country, and are much prized by the geologist.

“ 6. Numerous mineralized animal and vegetable remains occur imbedded in strata of different kinds; all these ought to be very carefully collected and preserved. Abundance of shells, in a fossil or petrified state, are met

with in limestone; of vegetables in slate clay, sandstone, &c.; and numerous bones, and even whole skeletons of quadrupeds, birds, amphibious animals, fishes, and even of insects, occur in rocks of various descriptions."

My original intention in preparing this paper was to confine myself to subjects connected with our own islands, but I found so many important queries and illustrations presenting themselves from among the phenomena observable in foreign countries, that I was unconsciously led to extend the heads of inquiry so as to make them applicable to these also. In truth, the same causes of disease exist in all countries, more or less, while their effects are proportionally elicited by circumstances peculiar to each. That physician who has studied the influences of external circumstances on the human constitution, in one situation, cannot, therefore, be long or greatly at a loss to detect them in another, and thus observations made under the burning sun of the Indies may materially assist the investigation of the origin of disease in the less fervid temperature of northern climes.

EXTRACTS

FROM AN ESSAY ON MALARIA BY THE LATE
JOHN MACCULLOCH, M. D., F. R. S.

MARSH POISON OR MALARIA.

This is the unseen, and still unknown, poison to which Italy applies the term that I have borrowed, Malaria. This is the cause of fevers, both ordinary and intermitting; but it is the cause also of other disorders, scarcely less important in point of numbers and of mortal power. Such are dysentery and cholera; and yet all these united form, but one portion of the enormous mass of disease of suffering, and of mortality dependent on this single cause.

TEMPERATURE, CLIMATE AND SOIL PRODUCING MALARIA.

To commence with some general remarks, as they may be applied to those cases or countries, where I have been unable to specify the exact geographical sites, Malaria may be expected during the warm season, and particularly under the various circumstances of heat and moisture formerly discussed, in every country in which the mean annual temperature is 45, or even less, much more certainly when that reaches to 50, and most indubitably when it exceeds that, in all such places or tracts as the following.

In the warmer climates in particular, yet in all climates under exceptions or modifications, unnecessary perhaps

to detail after what has been said, and which would be tedious at any rate to specify, it will be the produce of the great alluvial districts which attend the large rivers of the world, such as the Oroonoko, the Euphrates, the Ganges, the Danube, the Congo, and so forth; and in those cases, therefore, it will occupy an extent which is easily assigned by a geographical eye, even on a well constructed map. This will be one leading guide as to a judgment respecting such places or tracts of land as I have not here specified, even in the countries which I have noticed; as it will be for those quarters of the world which I have omitted; but in similar climates or wherever the temperature is sufficient, the same rule will hold good as to the smaller alluvial spaces attending rivers of less moment, or rivers of almost any dimensions; and such are, in fact, the leading features of those pestiferous tracts which abound on the shores of the Mediterranean.

Such portions of land, bounding or skirting rivers to whatever extent, are however most pernicious, whether situated inland or on the sea shore, when they include marshes, whether fresh or salt, when they are subject to inundation, like the vallies of Cochin China, Ava and Egypt, when they contain wet woods or jungles, and above all, elephant and bamboo jungles, or when on the sea line, protruding far beneath the influence of the tide, they give birth to mangrove and similar forests alternately occupied and deserted by the sea.

GENERAL SOURCES OF MALARIA.

Marshy or swampy land, or vegetation and subsequent decomposition taking place in a soil alternately wet and dry, or intermediate between moisture and dryness, is, as

has been fully shown, the general or most common basis of the whole evil, if it is not the sole and exclusive source of the diseases in question : and it is indifferent under what precise circumstances or forms of soil and site this essential fact exists ; as the space or extent seems equally indifferent, farther than as relates to the extent or range of the evil.

The next essential circumstance is, an active vegetation followed by a rapid decomposition ; and as this is always proportioned to the temperature, directly, moisture being presumed to be necessarily present, it is thence easy to compute, with sufficient precision for this view, where we are to expect Malaria and its diseases. Hence the latitude alone proves nothing ; since, in elevated intertropical situations, the tendency of vegetable death is, as in cold climates, to produce peat, as I formerly showed, rather than to fall into that more perfect decomposition which seems necessary to the generation of Malaria.

BREAKING UP OF PASTURELANDS, AND CLEARING OF WOODS.

Fevers, and therefore it must be presumed Malaria, are often produced, and frequently in great severity, when pasture lands are for the first time broken up for cultivation. The evidence as to this is as abundant as it is unquestionable. Volney points it out as almost invariable in America ; and so does Rush, as I have noticed, particularly where woods have also been cleared. In the West Indies, very generally, it has long been known that this is a most dangerous operation, since it is the almost universal experience of two centuries ; and Cassan describes it as sometimes producing fevers that resemble an absolute plague ; the labourers even dying on the spot

if they attempt to remain at night on the ground which they have broken up in the day.

TREES.

If woods or trees do, in certain and sufficiently numerous cases, generate Malaria, and thus render a district unhealthy, they are also often a safeguard; or a country which was before healthy, may become the reverse by cutting them down. In such cases, the poison is actually produced sometimes by this change; in others, the propagation merely is facilitated or extended. As a proof of the former fact, Rush has observed, that in Pennsylvania, epidemics invariably follow the clearing and cultivation of forest lands, and that they do not disappear till after many years of continued agriculture.

RIVERS.

If indeed any argument were wanted farther, to prove that the perpetual flow of fresh water, or the alternate rise and fall of the tide so as to cover twice in the day a tract of the nature in question were not remedies or preventives against the production of Malaria, it is amply demonstrated, and in a thousand places, in the intertropical or hot climates, as I formerly suggested when speaking of salt marshes. One or other of these is the condition of those rivers, the character of which will be understood by all who know the nature of such regions, when I call them Mangrove rivers, let the woody vegetation or jungle consist of what it may: and similar tracts of mangrove, or of other jungle or thicket, occur almost every where in those countries, which, if they do not give

passage to a river, are perpetually washed by the clear green sea. Yet no one needs be told, that all pestiferous soils or tracts, none exceed these in destructiveness; the Malaria being never absent from the margins of such a river, even when steadily full, and appearing at the ebb tide, in the other kind of situations almost at the very moment the ground emerges from the water; a fact amply and bitterly ascertained in our Naval Service, every where.

Whatever doubts may still exist as to rivers in general in our own country, in this case there is no reason whatever to doubt that such streams as the Ouse, the Lee, and all others flowing with similar difficulty through fertile meadows and with a flat vegetable margin, are productive of Malaria, because the diseases which attend it are common in all those situations. And, *a priori*, we ought to form this conclusion, because the margins of such streams in particular are in every sense marshes. And abundant facts, falling under my own observation, have shown that such diseases as I have formerly adduced in proof of Malaria, exist habitually and endemically on the borders of similar streams, of even the smallest size; on those, for example, which flow almost like artificial canals, through shaven lawns that border them with a thin and grassy margin. Here indeed, in England, popular opinion decides that no such disease can be generated where water flows, even should it flow through a pond; but it is one of the cases where popular opinion is popular ignorance or prejudice; as it is sufficient for any careful observer to investigate such streams and the state of the inhabitants near them, in any part of England where they exist, to be convinced that the fact is as I have here stated it. That any one should study to introduce such ornaments into his grounds where they do not already exist, or select them as places for the formation

of pleasure grounds and the sites of houses, is one of those pernicious errors which it is a part of the object of this Essay to remove.

CANALS.

A canal, partaking partly of the nature of a sluggish river and partly of that of a stagnant pool, should naturally be esteemed a probable source of Malaria; because its margin possesses, or may possess, all the essential qualities of a marsh, as a diminution of its waters may expose mud impregnated with vegetable matter. This, in fact, is the point which we must always have in view; it is the analysis of the whole question. If it is not putrifying mud, it is the marshy spot, the peculiar vegetation, or death of vegetation, carried on at a certain point of vacillation between earth and water, which is the generative cause; and while this may exist in a hundred different characters of ground or situation, and while farther it is not essential that bulk or space should be present, it is easy to see that the business of investigation is, in reality, reduced to a very simple principle; for those at least who are gifted with the powers of observation and generalization. Let this fact be ascertained by a due examination of any spot, and the probability, at least, of Malaria is established: let it farther be ascertained that certain diseases do belong to those situations, taking care also to prove that they are endemic or local, and the fact of its production is determined. That such confined spots do not act far beyond their immediate limits, that they do not produce the same wide effects of diseases as extensive marshy tracts, does not prove that they are not seats of Malaria. That which is originally but small in quantity, may, by being transported even to a short distance, be

diluted to nothing, or to absolute inactivity ; while farther, in all such cases, it will depend on many collateral circumstances whether the poison which they produce shall extend to any marked or notable distance or not. This is the common and constant error, whence the pernicious nature of such confined spots, be their characters what they may, is overlooked or denied. We are not to expect that a pool of a few square yards is to cause fevers throughout a whole country, while also it may be so situated as never or rarely to be approached. But if it can affect its immediate neighbours, or excite but one fever in the course of years, the fact is as fully proved as it is of the pontine marshes.

SOURCES OF DISEASE NOT GENERALLY KNOWN.

There can be no doubt either, that the minute marshy or swampy spots which occur occasionally in a thousand low situations, whether on commons, near woods, by road sides, or in innumerable other places where they scarcely or never attract notice, are similarly productive of malaria and disease, though their limited range of action generally renders their power in this manner insensible, unless when houses happen to be erected in their vicinity. Their characters as to vegetation are precisely the same as that of larger spots ; while it would be abundantly easy to quote examples of bad health, and even of severe fevers, produced by them ; though difficult and tedious to refer to the exact places, obscure as they are innumerable, or to convince the incredulous of the truth of the fact. As to the smaller spots of wood, or coppice, or brush-woods, as yet little suspected in England, even where extensive, I need not recur to a subject on which I have said all that was necessary in a former chapter ; since in this case, as

in that of marshy grounds, the possibility of a poisonous produce is not dependent on the extent: though were it possible to refer to the places, or could the enumeration which has convinced myself, produce any greater conviction than the general fact thus stated as operating on my own, it would be easy enough to enumerate the specific examples on which this general assertion is founded.

UNHEALTHY LOCALITIES—EFFECT OF TREES ON
VENTILATION.

I formerly remarked respecting unsuspected sources of Malaria is here applicable to houses, and even to houses on the highest scale of opulence, in numerous places; while, if ignorance has here been a valid excuse, it ought not to be such any longer. Nothing surely can be more fundamentally necessary respecting the choice of a site than that it should be salubrious, or at least free from absolute causes of disease, whether as a question of happiness or one of economy, since it involves both. But as it is unnecessary to dwell on the subject, I shall pass on to another cause intimately connected with that which I have been discussing, as being a modification of proximity.

The cause to which I allude may be called condensation; and if it has not been well studied or described, it is one which can be borne out by facts, as it might be anticipated to exist in certain circumstances. Or it is easy to suppose that while the production of Malaria is gradual and constant, it must accumulate, unless decomposed by chemical actions or dissipated by the winds; while, from the distances to which it is frequently carried, we have no reason to suppose that it is often or easily decomposed in the common atmosphere. Thus might we anticipate that

a marsh confined within the walls of a forest, as in the pine swamps of America, or the marshy ground of a jungle, or even our own moist woods, should accumulate Malaria in unusual quantity, and therefore in unusual virulence; and this seems to be established by the most ample experience in numerous places. Thus also might it be supposed that a similar soil, inclosed within high hills, or occupying a valley little susceptible of ventilation, should be peculiarly insalubrious; and this is proved by experience, though from deficiencies in the philosophy of Malaria, the cause has been often overlooked where the effect was known, producing some of the usual imaginary mysteries as to this poison.

If in the former way, we can perhaps explain the peculiar virulence of jungles and pine swamps, and even of woods, everywhere; thus also we can probably account for the activity of Malaria in many well known parts of France, Germany, Spain, and Italy, where its diseases prevail with peculiar activity and virulence; while the condensation, arising from want of ventilation, is often the result of a screen or enclosure of trees, if sometimes also dependent on the form of a valley. In the former case, the remedy is pointed out; while fortunately, it is a practicable one, because of that power over trees which is denied us in almost every other case of the imprisonment of Malaria. To detail the means, is unnecessary. The object is, ventilation; and circumstances must determine how this is most easily and effectually to be obtained. And, on this ground, we may see why it is, partly, that the clearing of new countries often exterminates or diminishes the diseases of Malaria, though there are cases, as I have already shewn, where this is the very cause of its production. It is not only that the soil is dried by exposure to the sun, that a formal drainage is established, or that the cultivation

of innoxious plants succeeds to that of an injurious vegetation, but that the poison which was formerly concentrated, is diluted or dispersed by the winds. How nearly this general rule may be applied to our own country residences, where uniting stagnant or still waters to the confinement of a woody lawn, it is quite superfluous to say. Those who cannot profit by general principles, but who must, at every minute, have the application made for them, are not of a capacity to profit by any thing.

CURRENTS OF MALARIA.

Having said all that appears necessary on the condensation of Malaria, I must proceed to inquire respecting its migration or dispersion, an intricate, and often an apparently mysterious subject. In this case, we are compelled to resort much more to facts than to theoretical reasonings respecting what ought to be, because of our ignorance respecting the motions of the atmosphere and the laws by which they are governed. It is true, indeed, that in a popular sense, we know whether the wind blows from the east or the west, but regulating ourselves by horizontal vanes, and by the movements of vessels on a similar plane, we have formed the inveterate habit of concluding that every wind must be horizontal, and that it must move in a straight line. Facts which it would be out of place to enumerate here, prove, not only that all this is fanciful or hypothetical, but that while the currents of the atmosphere are irregular and intricate in the greatest degree, they farther, scarcely in any instance obey the common law of rarefaction or unequal density by which they are supposed to be produced and regulated.

If we cannot therefore explain how a current of Malaria may be directed or limited, no motion can occur in one, so

unexpected or unreasonable, as not to find its solution in the capricious and intricate currents of the atmosphere.

If currents move vertically upwards, so May malaria; if in the reverse vertical, the Malaria may descend; while both these are facts ascertained. If its course is curvilinear, there are curvilinear winds enough to justify it; and thus of almost every caprice, in its propagation from this cause, which can be imagined.

F I N I S.

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